

**REMARKS**

Reconsideration of the above-identified application in view of the present amendments and comments is respectfully requested.

Claims 25-35 and 49-53 are currently pending in the subject application, and are presently under consideration. Claims 25-35, 52 and 53 are allowed. Claims 49-51 are rejected.

By the present amendment, claim 49 has been amended to recite a second more stable structural form after heat treatment, wherein said second more stable structural form further comprises domain sizes that exceed  $10^5$  square nanometers ( $\text{nm}^2$ ). Support for this amendment can be found at least at page 12, section C of the PCT publication (WO 2005/092516 A1).

In addition, New claims 54-57 have been added to the application. Support for New claims 54-57 can be found at least at page 5, lines 1 to 6 where a number of suitable polycyclic aryls for use in the invention are recited including biphenyl, terphenyl, as well as fused ring systems such as anthracyl and naphthyl, and hetero-aryl groups such as bipyridyl, terpyridyl, bithienyl, and terthienyl. Further support for New claims 54-57 can be found in Example 1 of the PCT publication where the aryl group is the polycyclic aryl, biphenyl. Applicants, therefore respectfully request that the amendment be entered as the present amendment does not add new matter.

Below is a discussion of the 35 U.S.C. §112, second paragraph, rejection of Claim 49, the 35 U.S.C. §102(b) rejection of claim 49, the 35 U.S.C. §103(a) rejection of claims 50-51, and the patentability of New claims 54-57.

**Rejection of Claim 49 Under 35 U.S.C. §112, Second Paragraph**

Claim 49 stands rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

According to § 2171 of the MPEP, there are two separate requirements under 35 U.S.C. § 112, second paragraph. First, the claims must particularly point out and distinctly claim the subject matter that the Applicants regard as the invention. Second, the claims must define the metes and bounds of the subject matter that is protected by the patent grant. As the

MPEP points out, an Examiner should explain whether the rejection is based on indefiniteness or on a failure to claim what the Applicants regard as their invention.

The requirement that the claims particularly point out and distinctly claim the subject matter that the Applicants regard as the invention, as the MPEP points out, is subjective. It is dependent upon what the Applicants regard as their invention. A rejection on this basis, according to the MPEP, is appropriate only where the Applicants have stated something different than what is defined in the claims. In other words, the invention that is set forth in the claims must first be presumed to be what the Applicants regard as the invention. If an Examiner does not agree, it is incumbent upon the Examiner to provide evidence to the contrary.

The requirement to define the metes and bounds is objective. It is not dependent on the views of the Applicants or any particular individual. It is evaluated according to the question of whether the scope of the claim is clear to the person of ordinary skill in the art. This is so that the uncertainties of claim scope should not be an issue. The essential inquiry, therefore, is whether the claims circumscribe a particular subject matter with a reasonable degree of clarity. In this regard, definiteness must be based (as the MPEP states) on the content in the patent application, the teachings of the prior art, and reasonable claim interpretation. While limitations from the specification are not read into the claims, the claims are interpreted not in a vacuum, but “in the light of the supporting disclosure”, *In re Morris*, 127 F.3d 1048 (Fed. Cir. 1997), and are interpreted as one of ordinary skill in the art would understand the claim terms. *Howmedica Osteonics Corp. v. Tranquil Prospects*, 401 F.3d 1367, 1371 (Fed. Cir. 2005). (“The definiteness of a patent claim depends on whether one skilled in the art would understand the bounds of the claim when read in light of the specification.”)

Furthermore, “in reviewing a claim for compliance with 35 U.S.C. § 112, second paragraph, the Examiner must consider the claim as a whole to determine whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function as required by 35 U.S.C. § 112, second paragraph, by providing clear warning to others as to what constitutes infringement of the patent” (MPEP 2173.02). Emphasis added by Applicants.

Accordingly, a claim must apprise one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. § 112, second paragraph.

In the present case, the Examiner states that the claims are “indefinite for failing to particularly point out and distinctly claim the subject matter that Applicants regard as the invention.” But no evidence has been offered to show that the Applicants have stated something different from what is defined in the claims. Therefore, Applicants submit that a rejection based on this rationale is improper and should be withdrawn.

The Examiner appears to argue that the claims fail to set forth the metes and bounds of the surface-modified layer system. In Section 4 on page 3 of the Office Action, the Examiner states the following:

“In claim 49, applicants recite that the SAM has a first less stable structural form prior to heat treatment and a second more stable structural form after heat treatment. It is unclear from the present claim language whether applicants are claiming the less stable SAM (before the heat treatment) which will turn to more stable structural form after the heat treatment or claiming the more stable SAM which was produced by the heat treatment from the less stable SAM” (original emphasis by Examiner).

Applicants respectfully put forth that claim 49 is definite and would apprise the user of the metes and bounds of the claimed subject matter and whether claim 49 is infringed. As discussed above, claim 49 defines the SAM as having a first less stable structural form prior to heat treatment and a second more stable structural form after heat treatment, the second more stable structural form having domain sizes that exceed  $10^5 \text{sq. nm}^2$ . The language “first less stable structural form prior to heat treatment and a second more stable structural form after heat treatment” defines a property or characteristic that is used to identify the SAM not whether the SAM as claimed is in a less stable or more stable structural form.

A party practicing a surface-modified layer system using any SAM would be put on notice that they are infringing claim 49 if the SAM they used had a first less stable structural form prior to heat treatment and a second more stable structural form after heat treatment that caused the second more stable structural form of the claimed SAM to have domain sizes that exceed  $10^5 \text{sq. nm}^2$ . The fact that the SAM can exist in two structural forms does not mean that the SAM must necessarily be in either structural form to define the metes and bounds of the claim.

Finally, the MPEP points out that only when a claim remains “insolubly ambiguous without a discernable meaning after all reasonable attempts at construction,” must a court declare it indefinite. *Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings*, 370 F.3d 1354,

1366, 71 USPQ2d 1081 1089 (Fed. Cir. 2004). That is not the case at hand. The present specification provides support for claimed structural forms of the SAM and describes the structural transitions between different (meta)stable SAM structures and associated changes in properties. In addition, the specification provides a specific example of a SAM having a first less stable structural form prior to heat treatment and a second more stable structural form after heat treatment where the second more stable structural form of the exemplary SAM has a domain size that exceeds  $10^5 \text{sq. nm}^2$  (See Example 1C).

For the reasons stated above, the Applicants respectfully submit that claim 49 adequately fulfills the two separate requirements under 35 U.S.C. § 112, second paragraph as claim 49 particularly points out and distinctly claims the subject matter that the Applicants regard as the invention and claim 49 defines the metes and bounds of the subject matter that is sought to be protected by the patent grant. Thus, withdrawal of the 35 U.S.C. §112, second paragraph, rejection of claim 49 is respectfully requested.

**Rejection of Claim 49 Under 35 U.S.C. §102(b)**

Claim 49 stands rejected under 35 U.S.C. § 102 (b) as being anticipated by Myerson, U.S. Publication No. 2003/0170999 A1 (“Myerson”).

The Office Action argues Myerson teaches a self-assembled monolayer (SAM) with local domain area sizes ranging from  $25 \mu\text{m}^2$  to  $2500 \mu\text{m}^2$ , and illustrates this SAM can be comprised of rigid biphenyl thiols. Since this range of domain sizes encompasses a SAM with domain area sizes exceeding  $10^5 \text{nm}^2$ , the Office Action argues Myerson teaches the present invention of claim 49.

Applicants respectfully submit that claim 49 is patentable over Myerson because Myerson fails to teach or disclose all the elements recited in amended claim 49. More specifically, Myerson fails to teach a SAM which exists in two forms and a SAM having domain area sizes exceeding  $10^5 \text{nm}^2$ .

Claim 49 recites a SAM which exists in two forms – a less structurally stable form and a more structurally stable form after heat treatment. Myerson teaches that when a patterned elastomeric stamp is inked with alkanethiols and applied to the surface of a substrate, SAMs are created where the stamp and the surface meet (paragraph [0048]). However, Myerson does not teach or disclose that these SAMs exhibit two different forms – one less structurally stable which becomes more structurally stable after heat treatment.

Since Myerson does not teach or disclose SAMs exhibiting two different forms, let alone one less structurally stable which becomes more structurally stable after heat treatment, Myerson does not anticipate claim 49, as anticipation requires each and every element set forth in the claim to be found in a single prior art reference.

Moreover, Myerson fails to teach or disclose all the elements recited in amended claim 49 because Myerson fails to teach a SAM with domain area sizes exceeding  $10^5 \text{ nm}^2$ .

Myerson teaches the use of SAMs as surfaces for nucleation and growth of inorganic and organic crystals (paragraphs [0013]-[0014]). By using SAMs as nucleation surfaces, the crystal size of the inorganic and organic crystals grown upon them can be controlled by restricting the size and geometry of the SAM (paragraph [0013]). In order to do this, Myerson teaches forming patterns using SAMs through the use of a patterned elastomeric stamp or by photolithography to produce different micrometer sized patterns. These patterns may be comprised of, for example, circles, rectangles, squares and other two dimensional shapes that will be separated by spaces (paragraphs [0046]-[0049]). Each of the shapes that make up the pattern can be generated in the range from between  $25 \mu\text{m}^2$  to  $2500 \mu\text{m}^2$  (paragraphs [0049] and [0035]). Therefore, it is clear to one having ordinary skill in the art that Myerson refers to domain area sizes to describe the pattern of SAMs, *i.e.*, the sizes of the two dimensional shapes that make up the pattern of SAMs printed on the substrate. The shapes that make up the pattern act as nucleating sites to produce appropriately sized crystals of pharmaceuticals (paragraphs [0018] and [0020]).

In contrast, claim 49 of the present application defines domain sizes of the SAM, *i.e.*, given their normal meaning in the field of surface science as an area of perfect crystalline order, and in particular that the domain sizes of the second more stable structural form of the SAM after heat treatment, that exceed  $10^5$  square nanometers ( $\text{nm}^2$ ). For example, page 8, lines 5 to 7 teach that the thermal treatment results in changes in crystalline structure, which can be monitored using scanning probe microscopy. Figure 4D shows a scanning tunneling microscope image of the  $\beta$ -phase (*i.e.*, the second more stable structural form of the SAM after heat treatment) having crystalline domains greater than  $10^5 \text{ nm}^2$ , as opposed to  $< 10^3 \text{ nm}^2$  for the untreated structural form of the SAM ( $\alpha$ -phase), as shown in Figure 4A (see also, page 12, lines 5 to 27 of the PCT publication).

In Myerson, each of the two dimensional shapes having a size of between  $25 \mu\text{m}^2$  to  $2500 \mu\text{m}^2$  that make up the patterned SAMs each comprise a large number of smaller

crystalline domains of the SAM, such that the crystalline domains in Myerson would be considerably smaller than the  $10^5 \text{ nm}^2$  recited by present claim 49.

It appears that the Examiner does not recognize the term “domain” as a region of perfect crystalline order, as used in the present application and in the art, and has confused the term with an area of a printed shape that is repeated to form a printed pattern, as is the case in Myerson. Therefore, since the domains of the two dimensional shapes that make up the patterned SAMs are not equivalent to the SAM domain area sizes, Myerson fails to teach a SAM with domain area sizes exceeding  $10^5 \text{ nm}^2$  as recited in present claim 49.

Accordingly, Myerson fails to teach or disclose all the elements recited in amended claim 49 and Applicants respectfully request the rejection of claim 49 be withdrawn.

**Rejection of Claims 50 and 51 Under 35 U.S.C. §103(a)**

Claims 50 and 51 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Publication No. 2002/092722 A1 to Stolowitz, et al. Withdrawal of this rejection is respectfully requested for at least the following reasons.

In Section 8 of the Office Action, the Examiner argues that the teachings of claims 50 and 51 would be obvious to a person skilled in the art from the teachings of Stolowitz (US2002/0192722). Applicants respectfully disagree.

Stolowitz describes a self assembled monolayer comprising an organic compound having a boronic acid complexing moiety (paragraph 25). In one aspect, the organic compound has the formula X-R-Y, where X is an anchor group, R is an optionally substituted alkylene group optionally interrupted by one or more members selected from the group of a hetero atom, an amido atom, and combinations thereof (paragraph 26). The group R is an optionally substituted alkylene group that is interrupted by a hetero-atom, which is about 8 to 40 carbon equivalents in length (paragraph 77).

Applicants once again stress that an important feature of claims 50 and 51 is that the substrate (gold in claim 50 or silver in claim 51) determines the particular choice of the spacer group (an even number of carbon atoms for gold or an odd number of carbon atoms for silver). In other words, the molecular structure should match the substrate in order to produce advantageous bonding geometries (see *e.g.*, page. 4, lines 15 to 20 and page 6, lines 14 to 21 of the present application).

There is nothing in the teaching of Stolowitz that would specifically lead a skilled person to these exact combinations of substrates and spacer groups, as defined respectively in claims 50 and 51. Instead, Stolowitz teach a large number of possible combinations of SAMs that comprise a compound having the formula X-R-Y, where X is an anchor, R is an optionally substituted alkylene group optionally interrupted by one or more members selected from the group of a hetero atom, an amido atom, and combinations thereof, and which may be between 8 to 40 carbon equivalents in length.

In this respect, the present invention is akin to a selection invention, wherein the specific combinations of the anchor moiety having a spacer group selected from C2, C4, C6, C8 and C10 when a gold substrate is used or the spacer group being selected from C1, C3, C5, C7 and C9 when a silver substrate is used advantageously allow the SAM to be readily transformed into the more stable structural form in situ by thermal treatment (see page 6, lines 14 to 31). These advantageous properties discovered by the Applicants are limited to the specific combinations recited by present claims 50 and 51, as the above combinations provide advantageous bonding geometries and prevent any particular factor from dominating too strongly, as detailed on page 6, lines 14 to 31, as detailed on page 6, lines 14-31 of the PCT publication.

Not only is there no specific teaching in any example given by Stolowitz of the above combinations, there is also nothing in Stolowitz that would lead a skilled person to the particularly advantageous properties of the specific combinations of SAM and substrate given in claims 50 and 51 or to realize the specific advantages that these combinations provide, as there is no teaching in Stolowitz of producing a SAM in situ by thermal treatment of a less stable structural form.

Moreover, although Example 12 (paragraphs 204 to 207) of Stolowitz discusses relative stability of SAMs, this comparison is between two different systems with one being more stable than the other. There is no teaching in Stolowitz of the transition of the same molecular species from a less stable structure to a more stable structure, as recited in claims 50 and 51.

Further, the chain lengths of the aliphatic moieties in Stolowitz are generally too long for the effects described on page 6 of the present application to be observed. Claims 50 and 51 limit the maximum spacer group lengths to C9/C10, which advantageously facilitates the thermal treatment process (see page 6 lines 21 to 31 of the present application).

For the reasons described above, a skilled person would not be led from the teachings of Stolowitz to the features of either present claim 50 or claim 51 and therefore claims 50 and 51 should be patentable over the cited art. Accordingly, withdrawal of this rejection is respectfully requested.

**Patentability of New Claims 54-57**

New Claims 54-57 are dependent from claims 50-51. New claims 54-57 are patentable in view of Stolowitz because of the aforementioned deficiencies discussed above with respect to the rejection of claims 50-51 and because of the limitations recited in claims 54-57.

Claims 54 and 55 recite the limitation, wherein said aryl moiety is an extended aromatic unit. Claims 56 and 57 recite the limitation, wherein said aryl moiety comprises at least one of biphenyl, terphenyl, anthracyl, naphthyl, bipyridyl, terpyridyl, bithienyl or terthienyl. Stolowitz does not teach the use of an aryl moiety that is an extended aromatic unit nor does Stolowitz teach the use of an aryl moiety that comprises at least one of biphenyl, terphenyl, anthracyl, naphthyl, bipyridyl, terpyridyl, bithienyl or terthienyl.

In contrast Stolowitz teach a large number of possible combinations of SAMs that comprise a compound having the formula X-R-Y, where Y is a boronic acid complexing moiety. Claim 12 of Stolowitz, cited by the Examiner, illustrates that Y includes merely a single aromatic unit. Therefore, Stolowitz fails to teach an SAM having an extended aromatic unit aryl moiety, let alone an aryl moiety including at least one of biphenyl, terphenyl, anthracyl, naphthyl, bipyridyl, terpyridyl, bithienyl or terthienyl.

For the reasons described above, a skilled person would not be led from the teachings of Stolowitz to the features of present claims 54-57 and therefore claims 54-57 should be patentable over the cited art. Accordingly, withdrawal of this rejection is respectfully requested.

**CONCLUSION**

In view of the foregoing remarks, Applicants respectfully submit that the present application is in condition for allowance. Applicants respectfully request reconsideration of this application and that the application be passed to issue.

Please charge any deficiency or credit any overpayment in the fees for this amendment to our Deposit Account No. 20-0090.

Respectfully submitted,

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